NEW CASTLE COUNTY

POLICY BOARD
MELVIN SLAWIK, COUNTY EXECUTIVE
THOMAS MALONEY, MAYOR, CITY OF WILMINGTON
WILLIAM REDD, MAYOR, CITY OF NEWARK
DIRECTOR OF WILMAPCO, CHAIRMAN
208 ADMINISTRATOR, SECRETARY

ORIGINAL
(Red)

ONE PEDDLER'S I
PEDDLER'S VILLAGE
NEWARK, DE. 19702
(302)731-7670
(302)571-7827

AREAWIDE WASTE TREATMENT MANAGEMENT PROGRAM



December 4, 1975

Mr. Robert J. Blanco, Chief
Water Planning Branch
U.S. Environmental Protection Agency
Region III
6th and Walnut Streets
Philadelphia, PA 19106

Dear Mr. Blanco:

The following is a brief history and description of the Llangollen landfill problem.

Serious pollution of a major aquifer supplying significant domestic and industrial water needs in New Castle County has occurred as a result of leachate contamination from the abandoned Llangollen landfill. The leachate has contaminated several private wells and is threatening the Artesian Water Company Llangollen wellfield, which has produced up to 4.5 million gallons per day (mgd), and the Amoco Chemical Corp. wellfield, which yielded 1.7 mgd in 1974. Very recently, the Amoco water was found to be already showing signs of contamination. Since water supplies in northern New Castle County are approaching full utilization, the loss of such a critical aquifer through contamination cannot be tolerated.

The Llangollen landfill is located approximately two miles southwest of the City of New Castle, just east of the intersection of U.S. Routes 40 and 13 and along the north bank of Army Creek. It was sited in a worked-out sand and gravel pit and was operated for the County as a receptacle for municipal and industrial wastes, including liquid chemical wastes. More than 2,000,000 cubic yards were placed in the landfill from 1960 to 1968. The fill area itself is 4,400 feet long and 200 to 900 feet wide; roughly 56 acres.

The original excavation removed the sands and gravels of the Columbia Formation, Pleistocene stream deposits, which range in thickness from 10 to 60 feet in the Llangollen area. Material was removed from well below the water table. The excavation generally ceased when an iron-cemented conglomerate, representing the base of the Columbia Formation, or a dense red

ORIGINAL
(Red)

clay of the Potomac Formation, was encountered. The excavation may have continued into the Potomac sands where the confining clays were absent. The Potomac Formation consists of stream-deposited unconsolidated sands, silts, and clays of Lower Cretaceous Age. The formation is approximately 600 feet thick in the vicinity of the landfill and rests on a seaward-dipping bedrock surface. The Potomac Formation thickens and dips towards the southeast at approximately 40 to 140 feet per mile (uppermost and lowermost beds, respectively) in the study area.

Hydrologically, the generally coarse Columbia deposits serve as an infiltration and recharge gallery for the Potomac sands. Groundwater in the Potomac sand becomes confined (artesian) beneath the relatively impermeable beds of clay and silt as it travels seaward, down dip in the formation. Immediately beneath the landfill these clay and silt deposits are thin and locally sandy or absent, especially on the eastern half.

Refuse placement started at the eastern end of the gravel pit in 1960 and proceeded back to the west, reaching its capacity in 1968. Covering of the fill was done intermittently with all cover material obtained on-site. As the cover material and landfill space were depleted, excavation was renewed to provide both; resulting the removal, in some places, of the confining clay above the Potomac sands. Locations where the clay was naturally absent and those where it was removed provided significant conduits for leachate movement into the Potomac sands. Subsequent geologic investigations have confirmed that portions of the landfill lie on top of sands that are inclined southeastward and provide recharge to the aforementioned wellfields. Pumpage from the large wells of the Artesian Water Company and the Amoco Chemical Corporation has created several steep cones of depression (overlapping) and has lowered the piezometric head throughout the aquifer. Thus, leachate from the landfill which reaches the Potomac sands, moves down the hydraulic gradient toward the wells.

The Llangollen landfill reached field capacity several years ago. In addition, a large portion of the refuse is below the water table. Water enters the landfill by the infiltration of precipitation through the landfill surface and by lateral groundwater movement into the saturated lower portion of the landfill. Approximately fifty percent of the annual precipitation infiltrates to the relatively flat, permeable landfill surface. The combination of infiltrating precipitation and groundwater inflow have been estimated to contribute an average of 200,000 gallons per day to the landfill.

Since the discovery of the leachate movement in the spring of 1972, the leachate concentrations have increased markedly and the extent of the contaminated slug within the Potomac aquifer has grown. Recovery wells located by the County between the landfill and the Artesian wellfield, [illegible] reductions in pumping from the wellfield, have temporarily stabilized the leachate movement toward the latter. However, the slug is apparently still moving toward the Amoco wells, as evidenced by their recent contamination. Thus, in the three years since the discovery of the problem, leachate

AR108w54

ORIGINAL
(Red)

movement has only been partially checked, and, due to a variety of factors, no headway has been made toward implementing a satisfactory solution. Three consultant studies have been completed relating to the problem and possible solutions but no decisions have been forthcoming.

Three basic alternatives were investigated as possible solutions to the aquifer contamination: (1) Hydrogeologic isolation of the landfill combined with the collection and treatment of leachate and contaminated water, (2) Excavation and transportation of the refuse to another landfill or the ocean, or (3) Excavation of the refuse, followed by its incineration. The three alternatives have two outstanding similarities; one being that their feasibility is doubtful and the other, the tremendous costs associated with each. A brief discussion of the more salient points of the alternatives is presented here.

Uncertainty exists as to the effectiveness of hydrogeologic isolation of the landfill in providing a final solution to the aquifer degradation within a definite period of time. This doubt stems from a lack of knowledge about the "life-span" of the refuse in terms of leachate-generation capabilities. Secondly, adequate systems for treating the leachate and the contaminated water would be extremely difficult to design because of the great variability of leachate concentrations. The high capital and operating costs (15 million dollars) of this alternative militate against its implementation.

While the second alternative noted is the least expensive, only ten million dollars, and offers a relatively rapid absolute solution, its use entails serious environmental and political problems. Removal to an existing landfill would require extensive environmental controls and would result in an early retirement of that landfill. Construction of a new landfill to receive the refuse would require stringent and expensive controls, and would certainly encounter intense political opposition. In addition, the problems associated with transporting such highly offensive material through populated areas is obvious.

On-site incineration, the third alternative considered, involves capital costs ranging from 15 to 25 million dollars, which does not include operating costs. Several incineration techniques were preliminarily evaluated by the County's consultant, including conventional and stream-generating incinerators, the Union Carbide Purox System, fluid-bed incineration and the Black Clawson Hydrodisposal System. Serious questions remain about the technical feasibility of all of them.

Another factor is that regardless of which solution is selected, the recovery wells to remove the contaminated water in the aquifer would have to be operated for many years, adding further expense.



The major overriding obstacle to implementing substantial corrective measures is the very high investments required and the unwillingness of the

ORIGINAL
(Red)

affected jurisdictions to commit such monies, especially for actions which may not provide a satisfactory solution or that may even compound the problem.

This information should provide you with a comprehensive picture of the Llangollen problem in order to explore the possibility of Federal assistance. If you have any questions or require additional information, please contact me.

Very truly yours,

Merna Hurd
Program Administrator

DRF/MH:gm